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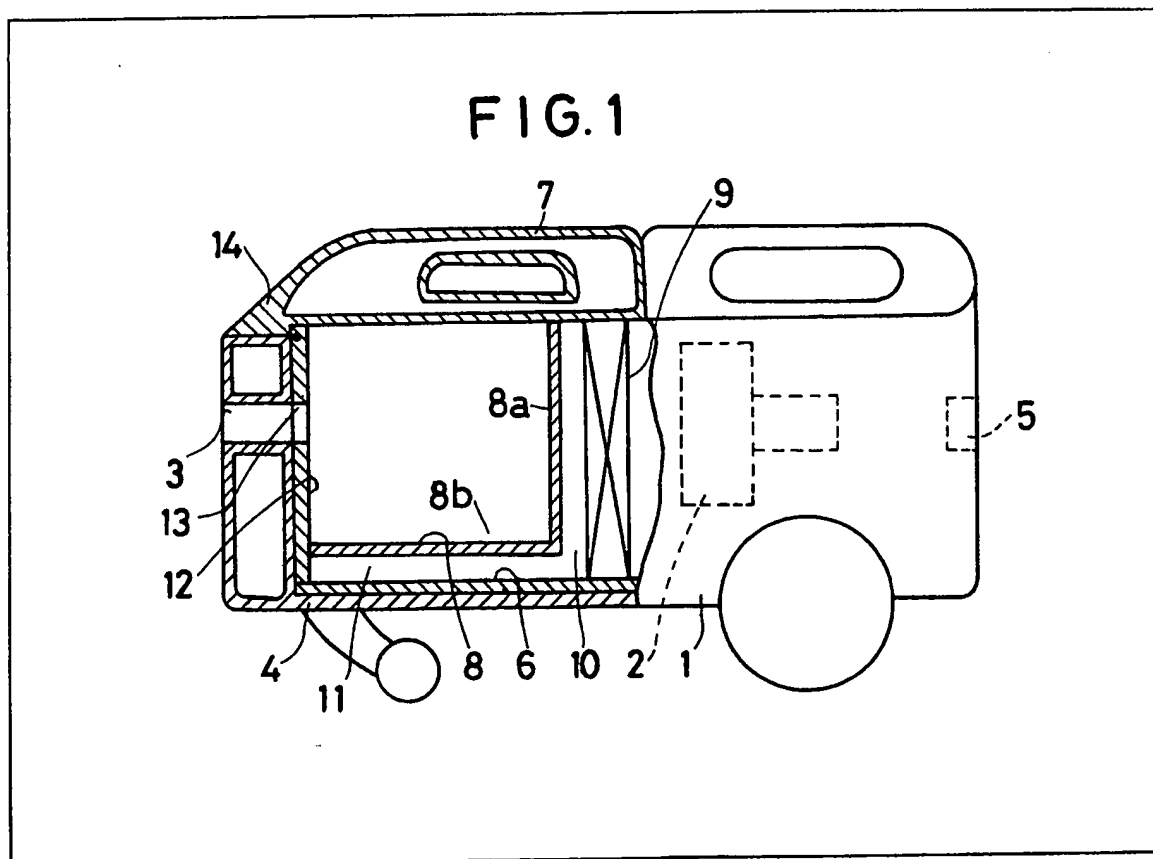
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(54) Vacuum cleaner

(57) A vacuum cleaner comprises a dust collector 6 detachably installed in the main body of the cleaner and enclosing a primary filter 18 composed of a horizontal wall and a vertical wall, both being permeable to air and removing coarse dust from air entering by inlet 3, and a finer secondary filter 9 downstream of filter 8. Handle 7 enables the dust collector to be lifted from the cleaner, and wall 12 then hinges back to allow dust to be tipped or shaken from the space inside filter 8 and from space 10, 11 between the filters. A movable grid may be provided to scrape the vertical wall of filter 8.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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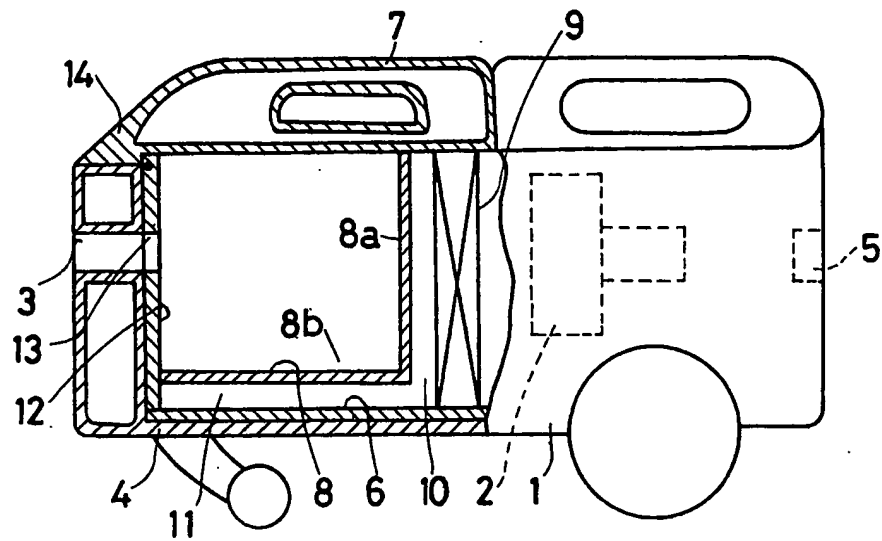


FIG. 1

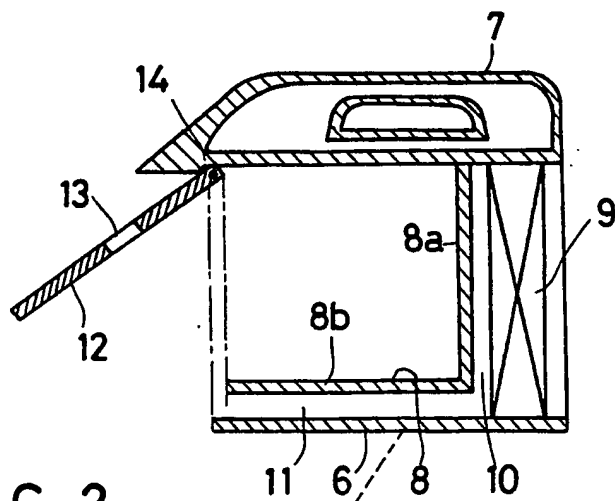
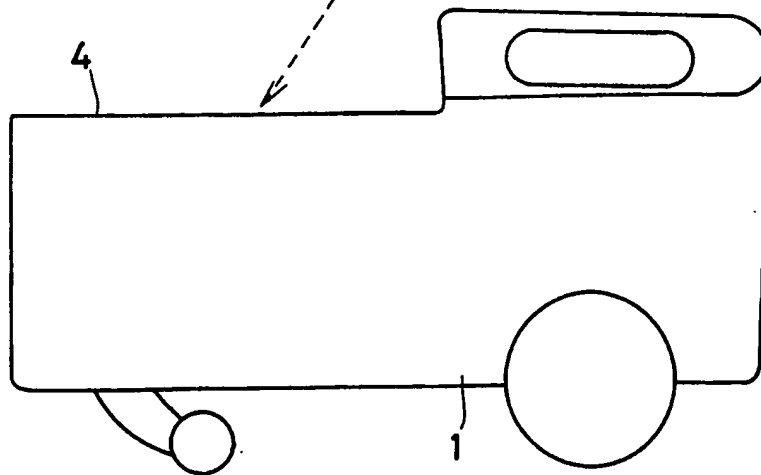


FIG. 2



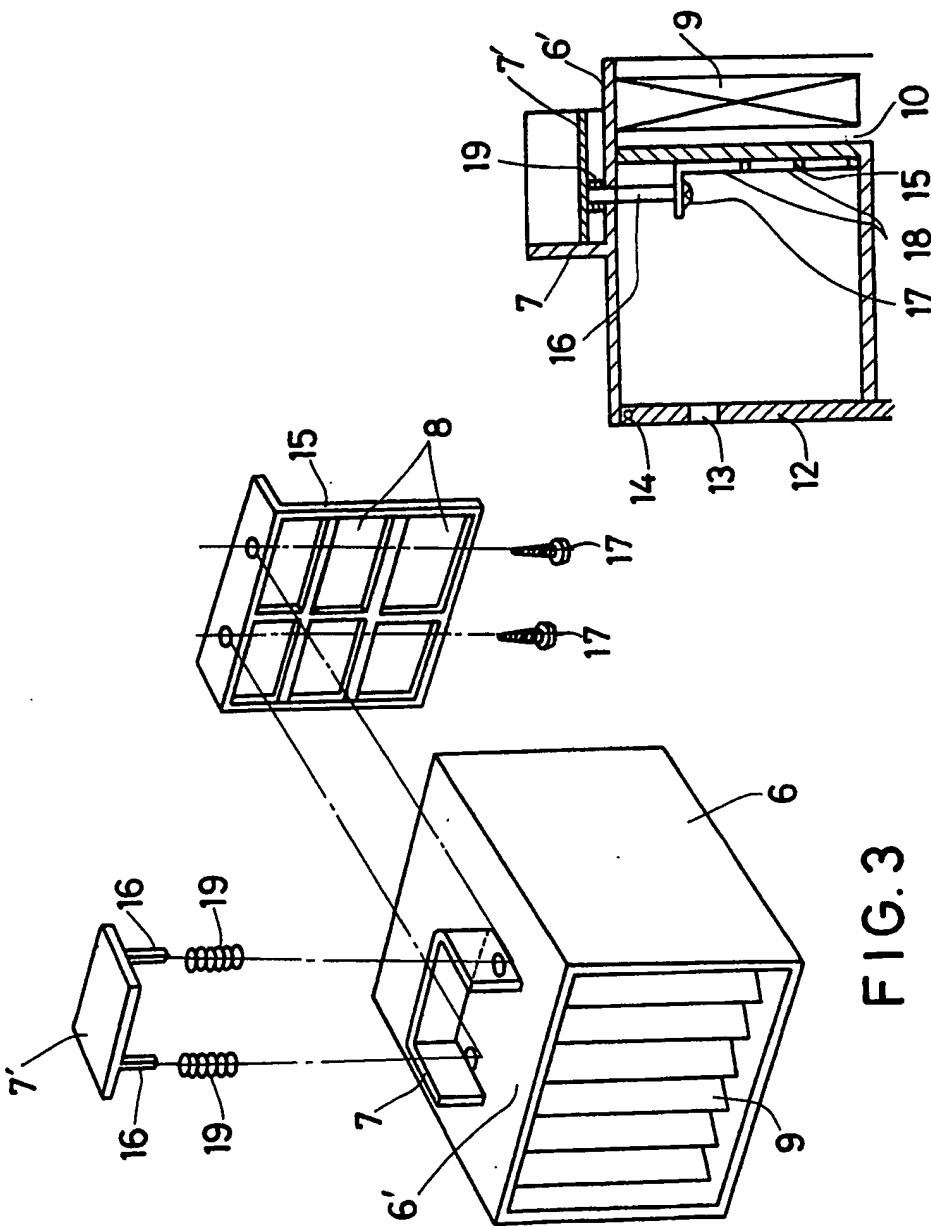


FIG. 4

FIG. 3

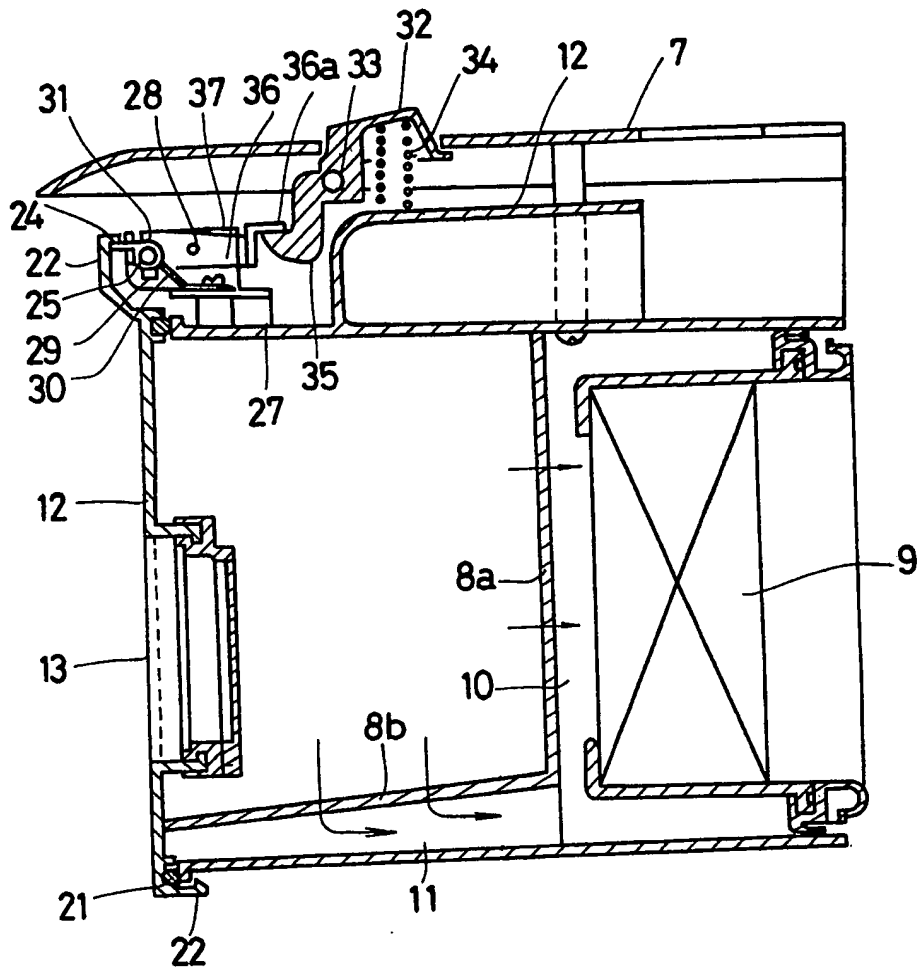


FIG. 5

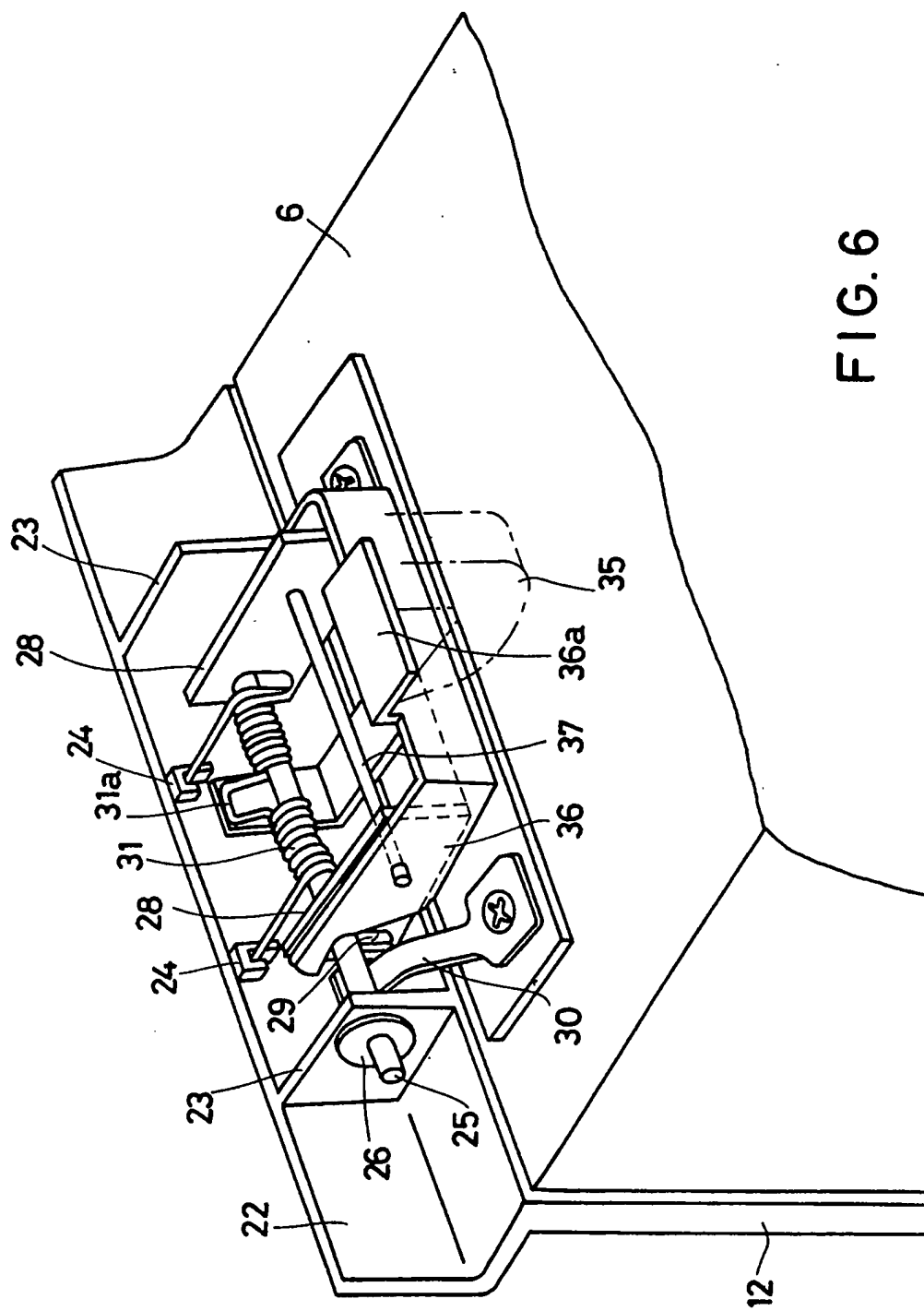


FIG. 6

SPECIFICATION

Vacuum cleaner with dust disposal

5 *Background of the invention*

This invention relates to a vacuum cleaner which provides a simple and clean way to dispose dust collected therein and enrich efficiency of dust removal without the need to soil the user's hands with dust.

A conventional way to dispose dust collected in a vacuum cleaner involves detaching a dust collector from the main body of the cleaner, removing a primary filter out of the dust collector and discarding the dust accumulated between the primary and secondary filters out of the collector. Therefore, the housekeeper should handle the filter by her hands in disposing dust and her hands become soiled and unwholesome. Because the primary filter consists of only a vertical wall perpendicular to the dust path, it is small in effective area for suction of dust and has the disadvantage that it is relatively early to load the filter with dust or other foreign substances.

25 *Object and summary of the invention*

Accordingly, it is an object of the present invention to provide a vacuum cleaner which has a device of disposing dust in a simple and clean manner and enriching efficiency of dust removal.

It is another object of the present invention to provide a vacuum cleaner which enables the user to handle a filter and discard dust without soiling her hands.

It is still another object of the present invention to provide a vacuum cleaner which assists dust accumulated in a dust collector drops easily off the dust collector.

According to the present invention, the above objects are achieved by providing a vacuum cleaner which comprises a dust collector detachably installed in a main body of the cleaner, a primary filter composed of a horizontal wall and a vertical wall and disposed within the dust collector, both said horizontal and vertical walls being permeable to air and behaving a dust filter, and a secondary filter disposed behind said vertical wall of said primary filter. A first path for dust is defined between the horizontal wall of the primary filter and the bottom of the body and merged into a second path developed between the vertical wall of the primary filter and the second filter. Preferably, the horizontal and vertical walls of the primary filter include a coarse mesh for catching relatively large dust and the secondary filter includes a fine mesh for catching relatively small dust which has passed through said primary filter. A lid is provided on the side of the primary filter opposite the vertical wall for release of dust accumulated onto said primary and secondary filters.

60 *Brief description of the drawings*

The present invention will be better understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention and wherein:

Figure 1 is a schematic cross sectional side view of a vacuum cleaner constructed according to the present invention;

Figure 2 is a view showing the cleaner with a dust collector as shown in *Figure 1* removed from the main body thereof;

Figure 3 is an exploded perspective view of a dust collector according to another embodiment of the present invention;

Figure 4 is a cross sectional view of the dust collector as illustrated in *Figure 3*;

Figure 5 is a cross sectional view showing a lid assembly in further detail; and

Figure 6 is a fragmentary perspective view of the lid assembly as shown in *Figure 5*.

Detailed description of the invention

Referring first to *Figure 1*, there is illustrated a vacuum cleaner containing in a main body 1 an electric blower unit 2, an air inlet 3, a concave chamber 4 and an air outlet 5. A dust collector 6 with a handle 7 is installed detachably within the chamber 4 from the top of the cleaner main body 1. A primary filter 8 is of a reversed "L" shape consisting of a vertical wall 8a and a horizontal wall 8b and includes a coarse mesh for collection of relatively large dust. The primary filter 8 is seated in a backward position in the dust collector 6. Preferably, the primary filter 8 may be set up by a plastic molding which includes as a unitary unit the two walls and the mesh. Disposed at a distance 10 behind the vertical wall 8a of the primary filter 8 is a secondary filter 9 for collection of relatively small dust. There is defined between the horizontal wall 8b of the primary filter 8 and the bottom of the dust collector 6 a path 11 for guiding dust, which path at its rear end is merged into and communicated with the path 10 between the vertical wall 8a and the secondary filter 9. The secondary filter 9 includes a fine mesh of a dimension smaller than that of the primary for catching relatively small dust which has passed through the primary filter. The secondary filter 9 may be made of a plurality of paper-made filtering segments together with each having the fine mesh permeable to air. A dust-disposal lid 12 has an opening 13 aligning with the air inlet 3 with the top end thereof being pivoted about the handle 14 by way of a hinge 14 and the remaining end in engaging relation with the primary filter 8 so as to close the front of the dust chamber 6.

When the blower unit 2 is driven and air together with dust is drawn via the air inlet 3, the dust laden air is admitted via the opening 13 into the dust collector 6, so that the relatively large dust is caught by both the vertical and horizontal walls 8a and 8b of the primary filter 8 and the remaining or relatively small dust traverses the primary filter 8 and is caught by the secondary filter 9. Only the dust-free air travels across the blower unit 2 and leaves via the air outlet 5.

Since the primary filter 8 is of the reversed "L" shape and both the vertical and horizontal walls 8a and 8b are permeable to air, the effective suction area of the filter is twice as large as that of the conventional filter to thereby reduce correspondingly the possibility of filling up the filter with the dust

or other foreign substances. It seems that the vertical wall 8a is first filled up with the dust or other substances because of its major flow of the dust-laden air through the vertical wall 8a and the secondary filter 9 and the horizontal wall then becomes more effective as a device of filtering the dust.

The dust collected in the dust collector may be thrown away in the following way. Relatively small dust drops off upon applying mechanical oscillation or the like to the secondary filter 9. Then, the user lifts the dust collector 6 out of the chamber 4, with the handle 7 being gripped, and carries to a desired site as it is. After the lid 12 is placed into open position, the dust accumulated between the lid 12 and the primary filter 8 is discarded outward. Since the dust accumulated is relatively large in size, it may be easily thrown away from the front of the dust collector 6 merely by declining the front side of the dust collector 6. The relatively small or fine dust trapped in between the primary filter 8 and the secondary filter 9, on the other hand, may be discarded together with the relatively large dust from through the path 11 between the primary filter 8 and the collector 6.

Figures 3 and 4 show another embodiment of the present invention, wherein there is provided a slide 15 as an aid in removing the dust tightly and persistently attached on the primary filter 8 and especially the vertical wall thereof. A top plate 7' of the handle 7 is coupled operatively with the slide 15 by standing studs 16 fixedly secured on the top plate 7' by screws 17 or the like. The slide 15 having a plurality of windows 18 is movable in a vertical direction so that it may strip off the dust attached on the vertical wall 8a of the primary filter 8. Compression springs 19 disposed around the standing studs 16 normally lifts the slide 15 so as to define a space 20 between the top plate 7' and the top of the dust collector 6 for allowing insertion of the user's fingers under normal condition of use.

Figures 5 and 6 show details of the lid opening assembly wherein the lid 12 has on its fringe a packing seal 21, at its lowest end a hook 22 engageable with a downward oriented edge of the dust collector 6 and at its highest end an "L" shaped bend 22 and spaced-apart shaft supports 23. A vertical segment of the bend 22 is provided with a stop 24 intermediate the two supports 23. A shaft 25 is disposed to extend rotatably between the two supports by means of a speed nut 26 or other fittings. Furthermore, the shaft 25 is movable in a vertical direction in elongated slots 29 in wings 28 extending from a mounting 27 rested on the top of the dust collector 6 toward the "L" shaped bend 22. A leaf spring 30 is seated on the top of the dust collector 6 together with the above mentioned mounting 27 with its free end being held in engaging relation so as to bias upwardly the shaft 25 (that is, the lid 12). A coil spring 31 is disposed around the shaft 25 to give the lid 12 force of rotation, with its one end engaging with the free end of the wings 28 and its remaining end engaging with the stop 24.

The force of rotation around the shaft 25 as originating from the force of the coil spring 31 and the force

of lift as originating from the force of the leaf spring 30 always are exerted on the lid 12, so that the lid 12 moves downwardly and the hook 20 disengages from the bottom edge of the dust collector 6 when the shaft 25 is depressed downwardly along the elongated slots 29 against the force of the leaf spring 30. The result is that the lid 12 is rotated clockwise around the shaft 25 and moved out of the front opening of the dust collector under the influence of the coil spring 31. To place the lid 12 into closed position, the lid 12 is manually rotated counterclockwise so that the hook 21 engages into the bottom edge of the dust collector 6. Upon further counterclockwise rotation of the lid 12 the lid 12 moves somewhat downwardly due to the movement of the hook sliding over the bottom edge and the hook 21 itself shifts into locked position.

An actuator button 32 is secured rotatable around a pin 33 to unlock the lid 12 and normally extends beyond the top plate 7' of the handle 7 under the influence of a spring 34. The actuator button 32 has at its lower portion an integral pawl 35 with which a tongue 36a of an actuator lever 36 engages. The actuator lever 36 is secured rotatable around a rod 37 extending between the wings 28 and has its free end engaging with the shaft 25 in such a direction as to hoist the shaft 25. In other words, when the actuator button 32 is depressed against the force of the spring 34, the pawl 35 moves upwardly, permitting the actuator lever 36 to rotate counterclockwise and move the shaft 25 downwardly with its tip. This arrangement facilitates the opening and closing movement of the lid and removal of the dust out of the dust collector. The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications are intended to be included within the scope of the following claims.

CLAIMS

1. A vacuum cleaner comprising:
 - a dust collector detachably installed in a main body of the cleaner,
 - a primary filter composed of a horizontal wall and a vertical wall and disposed within the dust collector, both said horizontal and vertical walls being permeable to air and behaving as a dust filter, and
 - a secondary filter disposed behind said vertical wall of said primary filter.
2. A vacuum cleaner as set forth in claim 1 wherein a first path for dust is defined between the horizontal wall of the primary filter and the bottom of the body and merged into a second path developed between the vertical wall of the primary filter and the second filter.
3. A vacuum cleaner as set forth in claim 1 wherein the horizontal and vertical walls of the primary filter include a coarse mesh for catching relatively large dust and the secondary filter includes a fine mesh for catching relatively small dust which has passed through said primary filter.
4. A vacuum cleaner as set forth in claim 1

wherein a lid is provided on the side of the primary filter opposite the vertical wall for release of dust accumulated onto said primary and secondary filters.

5 5. A vacuum cleaner as set forth in claim 4 further comprising an actuator means for actuating said lid into locked position or unlocked position.

6. A vacuum cleaner as set forth in claim 5 wherein said actuator means includes an actuator
10 button disposed over said dust collector and an actuator lever movable in a vertical direction in response to actuation of said actuator button.

7. A vacuum cleaner substantially as herein described with reference to Figures 1, 2, 5 and 6,
15 optionally modified as described with reference to Figures 3 and 4, of the accompanying drawings.